

What is claimed:

1. A hybrid mobile communication system for switching a call connection to a CDMA 2000 1X system when a malfunction occurs in a CDMA 2000 1xEV-DO system, the hybrid mobile communication system comprising:

a hybrid access terminal operated in a 1X mode in relation to a 1X system for receiving a voice signal transmission service or a low-rate data transmission service from the 1X system and in a 1xEV-DO mode in relation to the 1xEV-DO system for receiving a high-rate data transmission service from the 1xEV-DO system, in which the hybrid access terminal trying a call connection to the 1xEV-DO mode in order to receive the high-rate data transmission service is switched to the 1X mode when receiving a connection deny message from the 1xEV-DO system, thereby carrying out the call connection to the 1X system and receiving the high-rate data transmission service through the 1X system;

20 a 1xEV-DO access network transceiver subsystem for providing the high-rate data transmission service to the hybrid access terminal through an air interface;

a 1X transceiver for providing the voice signal transmission service or the low-rate data transmission service to the hybrid access terminal;

25 a 1xEV-DO access network controller for controlling the high-rate data transmission service of the 1xEV-DO access network transceiver subsystem;

a 1X controller for controlling the voice signal transmission service or the low-rate data transmission service of the 1X transceiver;

5 a mobile switching center for providing a communication access path by switching to the 1X system in response to a communication call transmitted from the hybrid access terminal; and

10 a packet data serving node (PDSN) for transmitting/receiving high-rate data to/from the 1xEV-DO system in a form of an internet protocol (IP) packet.

2. The hybrid mobile communication system as claimed in claim 1, wherein the hybrid access terminal is set to the 1X mode in an idle state thereof in order to make 15 communication with the 1X system and is periodically switched to the 1xEV-DO mode at a predetermined period of time so as to check whether or not data are received through the 1xEV-DO system and returns to the 1X mode.

20 3. The hybrid mobile communication system as claimed in claim 1, wherein the hybrid access terminal receiving high-rate data from the 1xEV-DO system in the 1xEV-DO mode is periodically switched to the 1X mode at a predetermined period of time so as to check whether or not voice signals 25 are received through the 1X system and returns to the 1xEV-DO mode.

4. The hybrid mobile communication system as claimed in claim 1, wherein a TDMA (time division multiple access) method is utilized in a case of a forward link transmitting data from the 1xEV-DO system to the hybrid access terminal,
5 and a CDMA (code division multiple access) method is utilized in a case of a reverse link transmitting data from the hybrid access terminal to the 1xEV-DO system.

10 5. The hybrid mobile communication system as claimed in claim 4, wherein a hard handoff is carried out in case of the forward link, through which data are transmitted from the 1xEV-DO system to the hybrid access terminal, by transmitting data with maximum power without performing power control, and a soft handoff is carried out in case of
15 the reverse link while performing the power control with respect to each hybrid access terminal.

20 6. The hybrid mobile communication system as claimed in claim 1, wherein the hybrid access terminal switches from the 1xEV-DO mode into the 1X mode by tracking the frequency of the 1X system using a searcher module under the control of a mobile station modem (MSM) chip.

25 7. The hybrid mobile communication system as claimed in claim 5, wherein the forward link includes a pilot channel used for transmitting a pilot signal allowing the 1xEV-DO system to track the hybrid access terminal, a MAC

(medium access control) channel used for controlling the reverse link, a control channel used for transmitting a broadcast message or a direct message for directly controlling a specific hybrid access terminal from the 1xEV-DO system to the hybrid access terminal, and a traffic channel used for transmitting only packet data from the 1xEV-DO system to the hybrid access terminal.

8. The hybrid mobile communication system as claimed in claim 1, wherein, in order to maximize a throughput in each sector and allot high-rate transmission to each user as possible depending on channel conditions, the 1xEV-DO system provides a high-rate data transmission service with a maximum power when transmitting the high-rate data to the hybrid access terminal in one sector.

9. The hybrid mobile communication system as claimed in claim 7, wherein the pilot channel is used as a reference for coherent detection of the wireless base station having the 1xEV-DO system by means of the hybrid access terminal.

10. The hybrid mobile communication system as claimed in claim 7, wherein the hybrid access terminal receives at least one pilot signal through the pilot channel and accesses to a wireless base station, which has transmitted a pilot signal having greatest intensity.

11. A method for switching a call connection to a CDMA 2000 1X system when a malfunction occurs in a CDMA 2000 1xEV-DO system, the method comprising the steps of:

- 5 (a) initializing a 1X mode for making communication with the 1X system and a 1xEV-DO mode for making communication with the 1xEV-DO system and staying in an idle state;
- 10 (b) performing dual monitoring with respect to the 1X mode and the 1xEV-DO mode;
- 10 (c) causing the 1xEV-DO mode to enter an active state so as to transmit/receive multimedia data;
- 15 (d) transmitting a connection request message to the 1xEV-DO system, thereby requesting a call connection;
- 15 (e) judging whether or not a connection deny message is received from the 1xEV-DO system;
- 20 (f) stopping an operation of the 1xEV-DO system when the connection deny message is received, and causing the 1X mode to enter an active state by switching hybrid access terminal into the 1X mode; and
- 20 (g) transmitting/receiving data by carrying out the call connection with the 1X system.

12. The method as claimed in claim 11, wherein, in step (e), when not receiving the connection deny message but receiving a connection acknowledgment message from the 1xEV-DO system, the hybrid access terminal carries out the call connection by forming a connection and a session with the

1xEV-DO system, and then performing a process of transmitting/receiving high-rate data.

5 13. The method as claimed in claim 11, wherein, in step (a), in the idle state, the hybrid access terminal is set to the 1X mode so as to make communication with the 1X system, is periodically switched to a 1xEV-DO mode at a predetermined period of time so as to check whether or not high-rate data are received from the 1xEV-DO system, and
10 returns to the 1X mode.

15 14. The method as claimed in claim 11, wherein, in step (b), while receiving high-rate data in the 1xEV-DO mode, the hybrid access terminal is periodically switched to the 1X mode at a predetermined period of time so as to check whether or not a voice signal is received through the 1X system and returns to the 1xEV-DO mode.

20 15. The method as claimed in claim 12, wherein the session is set by requesting a UATI (Unicast Access Terminal Identifier) to the 1xEV-DO system and receiving the UATI from the 1xEV-DO system, the UATI is an ID of the hybrid access terminal, which represents a number assigned to the hybrid access terminal from the 1xEV-DO system, and
25 parameters used for handoff, power control, setup of a high-rate data call are set when the session is set between the hybrid access terminal and the 1xEV-DO system.

16. The method as claimed in claim 11, wherein a TDMA (time division multiple access) method is utilized in a case of a forward link transmitting data from the 1xEV-DO system to the hybrid access terminal, and a CDMA (code division multiple access) method is utilized in a case of a reverse link transmitting data from the hybrid access terminal to the 1xEV-DO system.

10 17. The method as claimed in claim 16, wherein the forward link includes a pilot channel used for transmitting a pilot signal allowing the 1xEV-DO system to track the hybrid access terminal, a MAC (medium access control) channel used for controlling the reverse link, a control channel used for transmitting a broadcast message or a direct message for directly controlling a specific hybrid access terminal from the 1xEV-DO system to the hybrid access terminal, and a traffic channel used for transmitting only packet data from the 1xEV-DO system to the hybrid access terminal.

18. The method as claimed in claim 17, wherein the pilot channel is used as a reference for coherent detection of the wireless base station having the 1xEV-DO system by means of the hybrid access terminal.

19. The method as claimed in claim 17, wherein the,

hybrid access terminal receives at least one pilot signal through the pilot channel and accesses to a wireless base station, which has transmitted a pilot signal having greatest signal intensity.

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20. The method as claimed in claim 14, wherein switching from the 1xEV-DO mode to the 1X mode is carried out by tracking the frequency of the 1X system using a searcher module under the control of a mobile station modem
10 (MSM) chip.

21. A hybrid access terminal for switching a call connection to a CDMA 2000 1X system when a malfunction occurs in a CDMA 2000 1xEV-DO system, wherein, the hybrid access terminal is operated in a 1X mode in relation to a 1X system for receiving a voice signal transmission service or a low-rate data transmission service from the 1X system and in a 1xEV-DO mode in relation to the 1xEV-DO system for receiving a high-rate data transmission service from the
15 1xEV-DO system, and the hybrid access terminal trying a call connection to the 1xEV-DO mode in order to receive the high-rate data transmission service is switched to the 1X mode when receiving a connection deny message from the 1xEV-DO system, thereby carrying out the call connection to the 1X system and receiving the high-rate data transmission service through the 1X system.
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22. The hybrid access terminal as claimed in claim 21,
wherein the hybrid access terminal is set to the 1X mode in
an idle state thereof in order to make communication with
the 1X system and is periodically switched to the 1xEV-DO
5 mode at a predetermined period of time so as to check
whether or not data are received through the 1xEV-DO system
and returns to the 1X mode.

23. The hybrid access terminal as claimed in claim 21,
10 wherein the hybrid access terminal receiving high-rate data
from the 1xEV-DO system in the 1xEV-DO mode is periodically
switched to the 1X mode at a predetermined period of time so
as to check whether or not voice signals are received
through the 1X system and returns to the 1xEV-DO mode.

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24. The hybrid access terminal as claimed in claim 21,
wherein a TDMA (time division multiple access) method is
utilized in a case of a forward link transmitting data from
the 1xEV-DO system to the hybrid access terminal, and a CDMA
20 (code division multiple access) method is utilized in a case
of a reverse link transmitting data from the hybrid access
terminal to the 1xEV-DO system.

25. The hybrid access terminal as claimed in claim 21,
wherein the hybrid access terminal switches from the 1xEV-DO
mode into the 1X mode by tracking the frequency of the 1X
system using a searcher module under the control of a mobile

station modem (MSM) chip.